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High Resolution 2D Dopant Profiling of FinFET Structures using Scanning Probe Microscopy ALEXANDER KHAJETOORIANS, JIANLONG LI, Department of Physics, University of Texas at Austin, LI SHI, Department of Mechanical Engineering, University of Texas at Austin, XIANG-DONG WANG, Freescale Semiconductor, CHIH-KANG SHIH, Department of Physics, University of Texas at Austin, SEMATECH INC. COLLABORATION — The ability to perform dopant/junction profiling with high spatial resolution is critical for development of future generation devices such as FinFET structures. Among various forms of scanning probe microscopy, scanning tunneling microscopy (STM) has demonstrated direct atomic imaging of dopant atoms on GaAs (110) surfaces. More recently, scanning thermoelectric microscopy (SThEM) (H.K. Lyeo, et al *Science* v.303 p816 (2004)) has been applied to profile GaAs $p-n$ junction with unprecedented spatial resolution. The key challenge to successfully apply these techniques to silicon based devices is to prepare a surface that is both chemically and electronically passivated. Here we present our progress toward this goal. In particular we will report STM and SThEM studies on silicon based electronic devices including FinFET structures. Moreover, we will present comparative studies of dopant/junction profiling using STM, SThEM, and scanning capacitance microscopy (SCM).

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